

EFFECTIVENESS OF TOPICAL APPLICATION OF EIGHT PERCENT STANNOUS FLUORIDE

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THE ANTICARIOGENIC action of topical stannous fluoride has been reported in many studies, the majority indicating a significant caries reduction (inhibition) after a series of four applications or one or two applications per year (1-8).

Because of its time-saving value, a one-treatment regimen is preferred by private and public health practitioners, as well as parents, teachers, and patients. The study reported here was designed to evaluate the effectiveness of 8 percent stannous fluoride applied topically once a year, for 2 years, to school children in Valley City, N. Dak.

All children who had previous topical and ingested fluoride histories were eliminated from the study. However, Valley City began fluoridating its water supply in the same month the study began, and the 288 children initially included started drinking fluoridated water at this time. These children were 9 to 13 years of age and were in grades four through six.

Materials and Methods

Each child was given a rapid but detailed dental examination using a portable dental chair, Burton mouth light, and No. 5 explorer. Two posterior bite-wing X-rays and one upper and one lower X-ray of the anterior teeth were taken. The anterior X-rays were taken by holding one film horizontally against the lingual of the upper teeth and another film against the lower teeth in the same manner. The entire procedure averaged 5 minutes per child. The X-rays were developed and read later, and the data were added to the individual examination charts.

The children were stratified according to close

similarity in DMF teeth and surfaces and number of unerupted permanent teeth. They were then randomly assigned from each stratum into two groups. A flip of a coin decided which would act as the control and which the study group.

A dental hygienist gave all the children in both groups rubber cup-pumice prophylaxis and scaled supra-gingival calculus. For the children in the study group, the teeth on one side of the mouth were isolated by cotton rolls held in place with Garmer holders. After the teeth were dried by compressed air, the hygienist applied freshly prepared 8 percent stannous fluoride solution using cotton applicators. The teeth were kept wet by reapplication for 4 minutes. The other side of the mouth was then treated in the same manner.

All the children in both groups again received prophylaxis at the start of the second year and the study group received another treatment.

Identical examinations were again made at the end of 2 years by the same examiner. Each child's second examination was completely independent of the first. The blind technique was used. Only permanent teeth fully erupted at the time of the first examination were included in the study. Missing teeth were considered to be three DMF surfaces, unless the tooth was present with more than three DMF surfaces at the first examination.

Results and Discussion

Of the 288 children at the beginning of the study, 62 dropped out during the 2-year period. The baseline comparisons for the remaining 226 children are shown below.

| | Treatment group | Control group |
|--|--------------------|------------------|
| Number of children----- | 111 | 115 |
| DMF teeth (mean)----- | 5.44 | 5.34 |
| DMF surfaces (mean)----- | 9.57 | 9.56 |
| Unerrupted permanent teeth (mean)----- | 9.08 | 9.05 |

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The following tabulation shows the mean DMF tooth and surface increments for the two groups over the 2-year period. The increments of new DMF teeth and surfaces were 26 and 24 percent less in the group treated with the stannous fluoride.

| | <i>Treatment group</i> | <i>Control group</i> | <i>Percent reduction</i> | <i>Probability</i> |
|-------------------------|------------------------|----------------------|--------------------------|--------------------|
| Number of children----- | 111 | 115 | | |
| DMF teeth | | | | |
| (increment) -- | 2.12±.218 | 2.87±.235 | 26.2 | <.02 |
| DMF surfaces | | | | |
| (increment) -- | 4.53±.409 | 5.98±.450 | 24.2 | .02 |

With regard to DMF increment by specific surfaces, as shown below, the occlusal surfaces of the treated group developed 34 percent less caries and the proximal surfaces 25 percent less caries than the same surfaces of the untreated group. However, the buccolingual surfaces showed practically no difference for the two groups.

| | <i>Occlusal surfaces</i> | <i>Proximal surfaces</i> | <i>Buccolingual surfaces</i> |
|-----------------------|--------------------------|--------------------------|------------------------------|
| Control group----- | 1.67 | 3.48 | 0.844 |
| Treatment group---- | 1.10 | 2.61 | 0.810 |
| Percent reduction---- | 34.1 | 25.0 | 4.0 |

With the use of the independent examination technique, reversals in diagnosis occur. These reversals were subtracted from the positive increment score of the individual. Eight reversals in DMF teeth and 26 reversals in DMF surfaces were found in the control group. The corresponding figures in the treatment group were 12 and 42.

How much effect, if any, the drinking of fluoridated water had on the study results is not known.

Summary

A 2-year study to evaluate the effectiveness of topical 8 percent stannous fluoride applied to permanent teeth was conducted with 226 school children, aged 9-13 years, in Valley City, N. Dak. Fluoridation of Valley City water began coincidentally with the study.

Using portable equipment, detailed clinical examinations, including bite-wing and anterior X-rays, were made at the beginning and end

of 2 years. The children were divided into two closely comparable groups by stratification for dental age and DMF surfaces, and randomly assigned to the control or treatment group. At the start of the first and second years both groups were given prophylaxis, followed by topical treatment for the study group.

The treated group developed 26 percent less DMF teeth and 24 percent less DMF surfaces than the control group. The probability in each case was .02 percent. The occlusal surface caries incidence of the treated group was 34 percent less and the proximal surface caries incidence 25 percent less. The buccolingual surfaces showed very little difference for the two groups. Fifty percent more reversals in diagnosis occurred in the study group.

It is not known whether the drinking of fluoridated water had any effect on the results.

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